Article

A survey of veterinarian mental health and resilience in Ontario, Canada

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Abstract — Our goal was to help address a lack of mental health research on Canadian veterinarians through estimation of the prevalence of depression, anxiety, compassion fatigue, burnout, and resilience in veterinarians in Ontario. We conducted a cross-sectional study using an online survey that investigated demographics, mental health, self-reported overall health, and satisfaction with sources of support. Validated, psychometric scales were used to measure depression, anxiety, burnout, compassion fatigue, and resilience. The mental health indices of participating veterinarians were in line with those of veterinarians in other regions, and reflective of poorer mental health compared to the general population. The scores for females tended towards poorer mental health relative to males. Reported levels of burnout and secondary traumatic stress were of particular concern. These results can be used to support evidence-based interventions to help veterinarians and veterinary students build their resilience so that they may better thrive in the face of occupational stresses.

Résumé — **Enquête sur la santé mentale et la résilience des vétérinaires en Ontario, Canada.** Notre objectif était d'aider à résoudre un manque de recherche en santé mentale chez les vétérinaires canadiens par une estimation de la prévalence de dépression, anxiété, fatigue de compassion, épuisement, et résilience chez les vétérinaires en Ontario. Nous avons mené une étude transversale en utilisant un sondage en ligne qui examinait les données démographiques, la santé mentale, l'état de santé général auto-rapporté, et la satisfaction avec les sources de soutien. Des échelles psychométriques validées furent utilisées pour mesurer la dépression, l'anxiété, l'épuisement, la fatigue de compassion, et la résilience. Les indicateurs de santé mentale des vétérinaires participants étaient conformes avec ceux de vétérinaires dans d'autres régions, et révélateurs d'une moins bonne santé mentale comparativement à la population générale. Les pointages pour les femmes tendaient vers une moins bonne santé mentale relativement aux hommes. Les niveaux rapportés d'épuisement et de stress traumatique secondaire étaient particulièrement inquiétants. Ces résultats peuvent être utilisés pour soutenir des interventions factuelles afin d'aider les vétérinaires et les étudiants vétérinaires à développer leur résilience afin qu'ils soient en mesure de mieux se développer vis-à-vis les stress occupationnels.

(Traduit par Dr Serge Messier)

Introduction

Veterinarian mental health is a reported area of concern in several countries worldwide. In the United Kingdom (UK), veterinarians were reported to experience high levels of anxiety, depression, and suicidal thoughts, and lower levels of positive mental well-being (1). Similarly, depression, stress, and burnout amongst veterinarians in Australia were found to be higher than in the general population (2). More recently, veterinarians in a large study in the United States (US) were reported to experience serious psychological distress, depression, and suicide ideation at higher rates than in the general population (3). However, other studies have reported no increase in risk of mental illness amongst veterinarians compared to the general population (4,5). Research investigating the mental health of Canadian veterinarians is sparse. A survey of members of the Canadian Veterinary Medical Association in 2012 highlighted concerns with self-reported burnout and suicide ideation (6), although the lack of use of standardized, validated, psychometric tools limits interpretation.

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High occupational stressors in veterinary medicine have been implicated in the levels of burnout, depression, anxiety, suicide ideation, and suicide reported for veterinarians (2,7). As such, an investigation of mental health and well-being of veterinarians should also evaluate resilience, as resilience can help protect against occupational stress and mental illness (8). To date, published research on resilience in veterinarians is sparse. Another area of growing interest in the veterinary profession is compassion fatigue, which represents a mental health concern specific to caregiving professions, but this has not been well-studied in veterinarians. Briefly, providing care for traumatized individuals, whether they be human or animal, can have both positive and negative consequences for the caregiver (9,10). In the Professional Quality of Life assessment, the related positive emotions are described as compassion satisfaction. Compassion fatigue is characterized as a negative consequence of repeated secondary exposure to the pain and suffering of others (9). Despite common usage, neuroscience research indicates that the term "compassion fatigue" is a misnomer, and the concept should be more appropriately referred to as "empathetic distress" (11). Long-term, empathetic distress can lead to burnout, which itself is characterized by high emotional exhaustion and depersonalization, and low personal accomplishment (12).

The mental health of care providers is important in and of itself, and more so when the potential impact on the recipients of care is considered. Research from human medicine has reported burnout and sub-optimal physician wellness to be associated with a number of negative healthcare outcomes, including lowered productivity, suboptimal patient care, reduced patient adherence and satisfaction, and increased risk of medical errors (13,14).

The lack of research on the mental health and resilience of veterinarians in Canada is a notable gap in knowledge. The goal of this provincial pilot study was to help address the relative lack of mental health research in Canadian veterinarians and to test study methodology before conducting a national study. The specific objectives were to determine the prevalence of depression, anxiety, compassion fatigue, burnout, and resilience in veterinarians in Ontario, Canada.

Materials and methods

A cross-sectional study using an online questionnaire administered *via* Qualtrics (Provo, Utah, USA) was conducted with veterinarians in Ontario from July 15 to November 30, 2015. Inclusion criteria were being: 18 years of age or older; able to read and write in English; and a veterinarian in Ontario. Data were collected anonymously and informed written consent was obtained before starting the questionnaire. The methodology used in this study was approved by the University of Guelph Research Ethics Board (15JN007).

Participant recruitment

Invitations to participate in the study were disseminated broadly across the Ontario veterinarian population. A notice was placed in 3 issues of the Ontario Veterinary Medical Association's bi-monthly newsletter; an electronic recruitment poster was sent out to provincial species-specific associations (i.e., Ontario Association of Equine Practitioners, Ontario Association of Bovine Practitioners, Small Ruminant Veterinarians of Ontario, Ontario Laboratory Animal Veterinary Association, Ontario industry veterinarians, and Central Canada Veterinary Association) for distribution to their members; and a recruitment poster was placed in Veterinary Purchasing Company Limited (an animal health product distribution company) deliveries over the span of 1 wk, reaching approximately 1800 clinics in Ontario. All of these notices included a short description of the study and a web address to access the online questionnaire.

Questionnaire

The questionnaire included 4 standardized, validated psychometric scales (described below). Participants were also asked demographic questions [e.g., age, gender (asked in open-text format)] and questions pertaining to: whether they were currently practicing clinical medicine; what type of animals their practice served (select all that apply: small, equine, bovine, small ruminant, avian/exotic, specialist, other); their current level of satisfaction with various sources of support (spouse/romantic partner, family, friends, and workplace); their mental health [e.g., family history of mental illness (yes/no)]; past history of mental illness (yes/no); and current self-rated overall health (poor, fair, good, very good, excellent).

Mental health scales

Depression and anxiety were measured using the 14-item Hospital Anxiety and Depression Scale (HADS) (15). This scale is composed of 2 subscales separately evaluating anxiety (HADS-A; "restless, anxious moods and thoughts") and depression (HADS-D; "state of loss of interest and diminished pleasure response"), each using 7 items (15). Subscale items are scored on a 4-point rating scale (0 to 3), such that scores can range from 0 to 21. Score cut-points were used to determine categories: 0 to 7 "non-case;" 8 to 10 "possible case;" 11 to 21 "probable case;" as per scale instructions (16). The HADS has been demonstrated to have good validity and reliability (17), and has been used in the UK veterinary population (1).

Burnout was measured using the 22-item Maslach Burnout Inventory-Human Services Scale (MBI-HSS) (18). This scale measures burnout on 3 subscales: Emotional Exhaustion (9 items); Depersonalization (5 items); and Personal Accomplishment (8 items). Each subscale is rated on a 7-point rating scale assessing frequency (responses ranging from "0 — Never" to "6 — Everyday"). Emotional Exhaustion "assesses feelings of being emotionally overextended and exhausted by one's work;" Depersonalization "measures an unfeeling and impersonal response towards the recipients of one's service, care, treatment, or instruction;" and Personal Accomplishment "assesses feelings of competence and successful achievement in one's work with people" (18). The term "recipient" was defined for participants as a "client or patient." Subscale scores were categorized as "high," "average," and "low." based on reported cut scores for medical occupations (12). For Emotional Exhaustion: 0 to 18 was "low," 19 to 26 was "average," and 27 or over was "high;" for Depersonalization: 0 to 5 was "low," 6 to 9 was "average," and 10 or over was "high;" and for Personal

Table 1. Demographic and career characteristics of participating veterinarians in Ontario (July–November, 2015).

Characteristic		Mean	Standard deviation	Minimum	Maximum	Median
Age (years)	**N = 368**	**45.0**	**11.8**	**24**	**75**	**46**
Female	*n* = 255	42.2	10.5	24	65	42
Male	*n* = 113	51.2	12.1	25	75	53
Years qualified[a]	**N = 362**	**17.7**	**11.9**	**0**	**52**	**17**
Female	*n* = 252	14.7	10.0	0	39	12.5
Male	*n* = 110	24.7	12.8	0	52	26
Hours worked per week	**N = 349**	**39.9**	**14.7**	**0**	**80**	**40**
Female	*n* = 245	39.6	14.3	0	80	40
Male	*n* = 104	40.7	15.7	0	80	40
Annual income	**N = 341**	**$107 693**	**$104 912**	**$0**	**$1 500 000**	**$85 000**
Female	*n* = 243	$95 141	$65 275	$0	$760 000	$80 000
Male	*n* = 98	$138 816	$163 023	$0	$1 500 000	$103 000

[a] Years since graduation from veterinary school or college.
N — Total number of participants per characteristic.
n — Number of male or female participants for each characteristic.

Accomplishment: 0 to 33 was "low," 34 to 39 was "average," and 40 or over was "high." A "high" score in Emotional Exhaustion plus either a "high" score in Depersonalization or a "low" score in Personal Accomplishment has been suggested to reliably discriminate burnout from non-burnout groups (19). The MBI is the most widely used, validated instrument for measuring burnout, and has been used in physicians, nurses, and other medical professionals (18), as well as in veterinary teams (20).

Compassion fatigue was measured using Version 5 of the Professional Quality of Life (ProQOL) scale (9). This 30-item scale consists of 3 subscales (Compassion Satisfaction, Burnout, and Secondary Traumatic Stress) to assess positive and negative elements of caregiving professions. The subscales each have 10 items which are measured on a 5-point rating scale of frequency (from "1 — Never" to "5 — Very Often"). Compassion Satisfaction measures the positive emotions and feelings which stem from doing one's job well. In the ProQOL scale, Burnout is defined as "feelings of hopelessness and difficulties dealing with work or in doing your job effectively" (p.17) and Secondary Traumatic Stress as the result of "work-related, secondary exposure to extremely or traumatically stressful events" (p.17) (9); in veterinary medicine, this could be due to interactions with clients or patients. In the ProQOL, the combination of Burnout and Secondary Traumatic Stress is the basis for Compassion Fatigue (9). A systematic review by De La Rosa et al (10) provides normative data for caregiving professionals, and suggests "low," "middle," and "high" categories based on the 25th median and 75th percentiles. These category cut-offs were used to interpret raw subscale scores here. The ProQOL has been used extensively to evaluate compassion fatigue in the human medical fields (9).

Resilience can be defined as stress-coping ability and was measured using the 25-item Connor-Davidson Resilience Scale (CD-RISC) (8). Each item is measured on a 5-point rating scale ("0 — not at all true" to "4 — true nearly all the time") such that total scores can range from 0 to 100, with higher scores indicating higher levels of resilience. The CD-RISC is reported to have sound validity (8,21), and has been used extensively in the human medical field (22), and in veterinary students (23).

Statistics

Person-mean imputation was used to account for missing scale or subscale items in the HADS, MBI, and CD-RISC, provided no more than 1 item was missing per scale or subscale; observations with 2 or more missing values per mental health scale or subscale were dropped from that analysis (1,21). Missing items on the ProQOL were handled according to the decision rules in the scale manual (score missing items as zero or omit response entirely) (9). Risk factor analyses were not an objective of this pilot study; descriptive statistics (i.e., means, standard deviations, medians, interquartile ranges, percentages) were used to describe the data. Chi-square tests were used to determine whether differences in mental health outcomes existed by month of survey completion, as a crude investigation for the potential for non-response bias (where "late responders" to the survey were used as a proxy measure of non-responders). Binomial exact confidence intervals (95% CI) were calculated for dichotomous proportions. All statistical analyses were conducted using StataSE 15 (StataCorp, College Station, Texas, USA).

Results

Participants

Data were collected from 412 participants. Based on an estimated 4500 licensed veterinarians in Ontario (24), this represents a conservative response percentage of approximately 9%. As there were no mandatory questions beyond the consent question, sample sizes vary, as noted. Table 1 describes the demographic characteristics of participants. Nearly 70% of participants (257/370) identified as female and 30.5% (113/370) as male. Most participants (91%; 338/371) reported they were currently practicing clinical medicine. Of the 338 participants practicing clinical medicine, most (73.3%; 242/330) practiced small animal medicine (including exotics, mobile, and emergency), followed by: mixed (small and large animal) animal

Table 2. Hospital Anxiety and Depression Scale (HADS) score results of participating veterinarians in Ontario (July–November, 2015).

Subscale and gender		Mean (SD)	Median (IQR)	IQR	Non-case (0–7) number (%)	Possible case (8–10) number (%)	Probable case (11+) number (%)
HADS-A (Anxiety)[a]	**N = 411**	**8.8 (4.3)**	**9**	**6–12**	**159 (38.7)**	**118 (28.7)**	**134 (32.6)**
Female	n = 256	9.4	9	6.5–12	86 (33.6)	77 (30.1)	93 (36.3)
Male	n = 113	7.7	7	5–11	59 (52.2)	25 (22.2)	29 (25.6)
HADS-D (Depression)[a]	**N = 411**	**5.2 (3.9)**	**4**	**2–7**	**310 (75.4)**	**64 (15.6)**	**37 (9.0)**
Female	n = 256	5.2	5	2–7.5	192 (75.0)	41 (16.0)	23 (9.0)
Male	n = 113	4.9	4	2–7	91 (80.5)	14 (12.4)	8 (7.1)
		Comorbid # (%)	95% CI				
Comorbidity[b]	**N = 411**	**29 (7.1)**	**4.8–10.0**				
Female	n = 256	20 (7.8)	4.8–11.8				
Male	n = 113	6 (5.3)	2.0–11.2				

[a] Gender sub-totals do not add to overall total due to missing gender data.
[b] Comorbidity defined as both anxiety and depression subscales having scores ≥ 11.
IQR — Interquartile range. N — Total number of score results from participating veterinarians. n — Total number of results from participating female and male veterinarians. SD — Standard deviation.

practice (11.8%; 39/330); equine medicine (5.2%; 17/330); mixed large animal practice (4.2%; 14/330); bovine only (2.1%; 7/330); a specialty form of medicine (1.8%; 6/330); and lab animal veterinarians (1.5%, 5/330). In terms of role at the practice (n = 335) amongst those participants practicing clinical medicine, approximately half of respondents were practice owners (51.6%, 173/335), 41% were associates (136/335), and approximately 8% indicated "other" practice roles (26/335).

Hospital anxiety and depression scale (HADS)
The results from the HADS are presented in Table 2. Approximately 1/3 of participants were classified as probable cases of anxiety based on a HADS-A score ≥ 11, and 9% of participants were classified as probable cases of depression based on a HADS-D score of ≥ 11. Furthermore, approximately 7% were classified as having comorbid anxiety and depression. Female participants tended to have higher anxiety and depression scores and percentage probable caseness than males.

Maslach burnout inventory — Human services scale (MBI-HSS)
The results from the MBI-HSS are presented in Table 3. Based on the scale's decision criteria (a "high" score in Emotional Exhaustion plus either a "high" score in Depersonalization or a "low" score in Personal Accomplishment) (19), 36.9% of participants in this survey could be classified as experiencing burnout [140/379 (95% CI: 32.1% to 42.0%)]. Female participants (37.8%) tended to have a higher proportion experiencing burnout (96/254; 95% CI: 31.8% to 44.0%) than male participants (32.7%) (37/113; 95% CI: 24.2% to 42.2%).

Professional quality of life scale (ProQOL)
Table 4 displays the results from the ProQOL. Female participants tended to have higher scores in Burnout and Secondary Traumatic Stress, and were more likely to be within the "high" category for these components of compassion fatigue. Although male and female participants scored similarly for Compassion Satisfaction, males were more likely to be in the "high" category for this subscale.

Connor Davidson resilience scale (CD-RISC)
The mean CD-RISC score (n = 368) was 70.4 (SD = 14.9; M = 71; IQR = 60.5–81). Approximately 74.5% of participants (95% CI: 69.7% to 78.8%) had scores lower than the scale's comparative norm (the general population of the United States) of 80.7 (22).

Satisfaction with supports
Overall, most participants (80.5%) were satisfied or very satisfied with the support provided by their spouse/romantic partner (269/334; 95% CI: 75.9% to 84.6%); family (70.2%) (257/366; 95% CI: 65.2% to 74.9%); and friends (69.8%) (256/367; 95% CI: 64.8% to74.4%). The percentage of participants satisfied or very satisfied with the supports provided by their workplace was lower, at 58.2% (210/361; 95% CI: 52.9% to 63.3%).

History of mental illness and current self-reported overall health
Approximately 33.1% (122/369; 95% CI: 28.3% to 38.1%) and 36.7% (135/368; 95% CI: 31.7% to 41.8%) of participants self-reported a personal and family history of mental illness, respectively. Participants self-reported their overall health to be: excellent (12.5%; 46/369); very good (29.5%; 109/369); good (36%; 133/369); fair (19%; 70/369); or poor (3%; 11/369).

Discussion
Overall, the mental health indices of participating veterinarians in Ontario were in line with those reported for veterinarians in other regions (1–3), and reflective of poorer mental health compared to the general population in many countries worldwide (10,12,22,25). The scores for female participants tended towards poorer mental health relative to males. This gender disparity has been reported previously in veterinarian populations (1–3), as well as in the general population (26). The literature suggests that while females are reported to have a higher prevalence of mood and anxiety disorders, males may have higher rates of "externalizing" disorders, such as substance abuse (26), which was not measured here. Females currently represent approximately 60% of the licensed veterinarians in Ontario (24), and

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Table 3. Maslach Burnout Inventory – Human Services Survey (MBI-HSS) score results of participating veterinarians in Ontario (July–November, 2015).

Subscale and gender		Mean (SD)	Median	IQR	Low[a] number (%)	Average[a] number (%)	High[a] number (%)
Emotional exhaustion[b]	N = 381	26.5 (14.3)	25	15–38	131 (34.4)	74 (19.4)	176 (46.2)
Female	n = 256	27.7 (13.8)	26	16–39	78 (30.5)	52 (20.3)	126 (49.2)
Male	n = 113	23.2 (14.7)	21	12–34	49 (43.4)	22 (19.5)	42 (37.2)
Depersonalization	N = 380	9.4 (6.3)	8	4–13	125 (32.9)	91 (23.9)	164 (43.2)
Female	n = 255	9.3 (5.9)	8	5–13	80 (31.4)	67 (26.3)	108 (42.3)
Male	n = 113	9.3 (6.8)	8	4–13	42 (37.2)	21 (18.6)	50 (44.3)
Personal accomplishment	N = 377	36.3 (8.0)	38	31–42	125 (33.2)	93 (24.7)	159 (42.2)
Female	n = 253	36.6 (7.9)	38	31–43	77 (30.4)	73 (28.9)	103 (40.7)
Male	n = 112	36.3 (8.0)	38.5	31–42	42 (37.5)	19 (17.0)	51 (45.5)

[a] Ranges vary by subscale (12): For Emotional Exhaustion: Low, 0–18; Average, 19–26; High 27–54. For Depersonalization: Low, 0–5; Average, 6–9; High 10–30. For Personal accomplishment: Low, 0–33; Average, 34–39; High 40–48.
[b] Gender sub-totals do not add to overall total due to missing gender data.
IQR — Interquartile range. SD — Standard deviation. N — Total number of score results from participating veterinarians. n — Total number of results from participating female and male veterinarians.

Table 4. The Professional Quality of Life Scale (Version 5) results of participating veterinarians in Ontario (July– November, 2015).

Subscale and gender		Mean (SD)	Median	IQR	Low[a] number (%)	Middle[a] number (%)	High[a] number (%)
Compassion satisfaction[b]	N = 388	37.6 (7.1)	39	33–42.5	106 (27.3)	158 (40.7)	124 (32.0)
Female	n = 255	37.8 (6.8)	38	33–42	66 (25.9)	109 (42.8)	80 (31.4)
Male	n = 113	37.8 (7.7)	39	32–44	33 (29.2)	39 (34.5)	41 (36.3)
Burnout[b]	N = 390	25.9 (6.9)	25	21–31	73 (18.7)	149 (38.2)	168 (43.1)
Female	n = 257	26.2 (6.9)	25	21–31	43 (16.7)	99 (38.5)	115 (44.8)
Male	n = 113	24.8 (6.6)	24	20–30	25 (22.1)	44 (38.9)	44 (38.9)
Secondary traumatic stress[b]	N = 387	24.4 (7.1)	24	19–29	17 (4.3)	100 (25.8)	270 (69.8)
Female	n = 255	25.1 (7.1)	24	20–30	7 (2.7)	62 (24.3)	186 (72.9)
Male	n = 112	22.5 (6.5)	22	17.5–26.5	9 (8.0)	35 (31.2)	68 (60.7)

[a] Ranges vary by subscale (10) compassion satisfaction (CS: for Compassion Satisfaction: Low, 10–33; Middle, 34–41; High 42–50). For Burnout: Low, 10–19; Middle, 20–26; High 27–50. For Secondary Traumatic Stress: Low, 10–13; Middle, 14–20; High 21–50.
[b] Gender sub-totals do not add to overall total due to missing gender data.
IQR — Interquartile range. SD — Standard deviation. N — Total number of score results from participating veterinarians. n — Total number of results from participating female and male veterinarians.

this gender gap in veterinary medicine is increasing, with an even larger proportion of the profession anticipated to be female in the future (27). If the observed gender trends in mental health outcomes persist, negative veterinarian mental health may therefore become more evident with time. This said, Seedat et al (26) suggest that the gender difference in major depression in general may become smaller as gender roles become more equal.

The proportion of participants who met the case definition for depression in this study is in line with that reported in veterinarians in the UK (1), and greater than that reported in Australian veterinarians (2). Depression amongst physicians in human medicine is reported to be negatively associated with patient care and positively associated with medical errors (13).

The proportions of participants who met the classifications for possible or probable cases of anxiety were somewhat higher than that found in veterinarians in the UK, as was the proportion of probable co-morbidity of anxiety and depression (1). Anxiety and depression co-morbidity has been suggested as a risk factor for suicide, above and beyond clinical depression or anxiety alone (3).

Potential for burnout among participants in this study was high, with almost half of participants experiencing high levels of emotional exhaustion and depersonalization. The estimated prevalence of burnout here was higher than that reported for Australian veterinarians, although different methodologies were used (2), and higher than that found in Dutch veterinarians using a Dutch version of the MBI (28). A study of veterinary team effectiveness in southern Ontario in 2014 measured burnout with the General Survey version of the MBI and reported lower proportions of emotional exhaustion (22.4% in high classification), cynicism (akin to depersonalization, 23.2% in high classification), and professional efficacy (akin to personal accomplishment, 9.2% in low classification) than was observed in participants here (20).

At present, there are no studies that describe the consequences of burnout on client and patient care in veterinary medicine, although studies in the human medical field raise concerns for veterinarians. Among physicians in human health care, burnout is implicated not only in reducing physician health (e.g., substance abuse, depression, suicide ideation, poor self-care), but also in negatively affecting both patient care (e.g., lower quality of care, medical errors, longer recovery times, lower patient satisfaction), and the health care system overall (e.g., decreased physician productivity, increased physician turnover,

reduced patient access, and increased costs) (14). Such negative impacts may therefore be concerns associated with veterinarian burnout as well.

Compassion fatigue stems from prolonged exposure to the stress and trauma experienced by recipients of one's care (10), which in veterinary work, includes both clients and patients. The 3 components measured by the ProQOL scale, Compassion Satisfaction, Burnout, and Secondary Traumatic Stress, provide insight into the veterinary professional's experience of providing care. Just under 3/4 of participants here had average or "high" Compassion Satisfaction, indicating that they felt rewarded by providing compassionate care for their clients and patients. A little under half of participants scored "high" in Burnout, which is a similar result to that measured here with the MBI, and over 2/3 of participants were categorized as "high" in Secondary Traumatic Stress. Secondary Traumatic Stress is a consequence of witnessing extremely or traumatically stressful events in others (9). The large proportions of participants in the high categories of Burnout and Secondary Traumatic Stress raise concern related to compassion fatigue.

Given that compassion fatigue is a unique experience of caregivers, normative benchmarks are based on other caregiving professions including nurses, trauma responders, and psychotherapists (10). Given the high level of Secondary Traumatic Stress experienced by veterinarians in this study, it is reasonable to believe it may be a specific and significant source of psychological distress for participants, even relative to other medical professions. The mean score experienced by veterinarians in this study was higher than that found in 29/30 studies of caregiving professionals covered in a recent review (10). Recent research into ethical conflict among veterinarians suggests that an inability to act or treat patients in a way "consistent with one's own moral compass" is a significant source of stress in the profession, and likely contributes to compassion fatigue (29; p.2116).

Importantly, research by neuroscientist Dr. Tania Singer at the Max Planck Institute for Cognitive and Brain Sciences in Germany indicates that "compassion fatigue" is actually a misnomer in that compassion activates regions of the brain associated with positive emotions and is neurologically rejuvenating (11). Instead, her research indicates that it is empathetic distress that leads to negative feelings, stress, burnout, and withdrawal (11) (a notion that speaks to a need for a change in our vocabulary within this field of research). Given the concerning results from the Burnout and Secondary Traumatic stress subscales of the ProQOL observed here, and given that compassion generates positive emotions and helps counteract the negative effects associated with empathic distress, interventions to help increase compassion skills in veterinary students and veterinarians are warranted. Compassion is a skill that can be cultivated, and "even with short periods of compassion training, participants continue to feel empathy for the suffering of others, but gain the capacity to feel positive emotions without feeling distress" (11).

The average resilience score reported here is lower than that of the general population of the US, and lower than or similar to various medical populations studied in the US (22). This is concerning as resilience helps protect against stress, substance use, mental illnesses, and suicide (22). Hence, the low levels of resilience observed here may increase participants' risk for mental illness and negative sequelae (8) associated with chronic stresses typical in veterinary settings (3). Fortunately, resilience is not a character trait and can be learned (8). For example, self-compassion and mindfulness have been found to be positively associated with resilience levels and protective against burnout in medical residents (30).

Bakker et al (31) reported that all 4 components of psychological capital (i.e., self-esteem, optimism, hope, and resilience) were positively associated with adaptive responses to depression in veterinary students. In human medicine, the development of mindfulness, compassion, and other stress-management skills have helped physicians combat the stressors that contribute to burnout and depression. For example: an online mind-body skills training program was shown to improve resilience, empathy, and mindfulness, and to decrease stress in a variety of healthcare providers (32); a randomized controlled trial of a stress management and resiliency training program in radiology faculty was shown to increase resilience, decrease stress, decrease anxiety, and enhance quality of life (33); a compassion fatigue resilience program was shown to decrease secondary traumatic stress in nurses (34); and a mindful communication course resulted in increased mindfulness, improved empathy and mood, and improvements across all 3 subscales of the MBI-HSS in primary care physicians (35). Hence, resilience interventions have the potential to improve physician wellness, which may ultimately lead to improved patient care. Given the similarities between human and veterinary medicine, it is reasonable to believe that resilience-building strategies will also support the well-being of veterinarians. The inclusion of evidence-informed well-being and resilience training programs in veterinary curricula is a recommended area of development. Given the low levels of satisfaction participants reported with mental health supports in the workplace, this could also be a useful endeavour for veterinary workplaces.

This cross-sectional study represents the mental health status of participating veterinarians at one moment in time. Although it is unlikely that our invitation reached all veterinarians in Ontario, based on a conservative response estimate of 9%, there is the potential for non-response bias and an under- or over-estimation of prevalence of mental health outcomes. We did not have data on non-responders, but we used participants who responded late to the survey (i.e., in September, October, or November) as a proxy for non-responders. While there was no significant association of HADS-A, HADS-D, the Emotional Exhaustion or Depersonalization subscales of the MBI-HSS, or the Burnout and Secondary Traumatic Stress subscales of the ProQOL with month of survey completion (data not shown), there was a significant association between month of survey completion and Personal Accomplishment score of the MBI-HSS ($P = 0.02$) and the Compassion Satisfaction score of the ProQOL ($P = 0.02$). Specifically, in the first month (July), there were higher frequencies of participants with low Personal Accomplishment and low Compassion Satisfaction than expected under the null hypothesis. This suggests that our estimates for low Personal Accomplishment and low Compassion

Satisfaction may be over-estimated due to non-response. Further investigation using random sampling and larger sample sizes would be useful. Finally, the self-reported nature of the data may have been subject to recall bias or socially desirable responding; however, the mental health scales used here have all been shown to have good reliability and validity.

In conclusion, the veterinarians in this study fared poorly relative to the general population on several mental health indices, with burnout and secondary traumatic stress being of particular concern. Going forward, investigating factors that are associated with veterinarian mental health, as well as an exploration of the lived experience of mental health and resilience of veterinarians using qualitative methods, will provide valuable information that will support the well-being of individual veterinarians and the veterinary profession. Evidence-based interventions to help veterinary students and veterinarians build their resilience so they may better thrive in the face of their occupational stresses are also encouraged.

Acknowledgments

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